PATENT ABSTRACTS OF JAPAN

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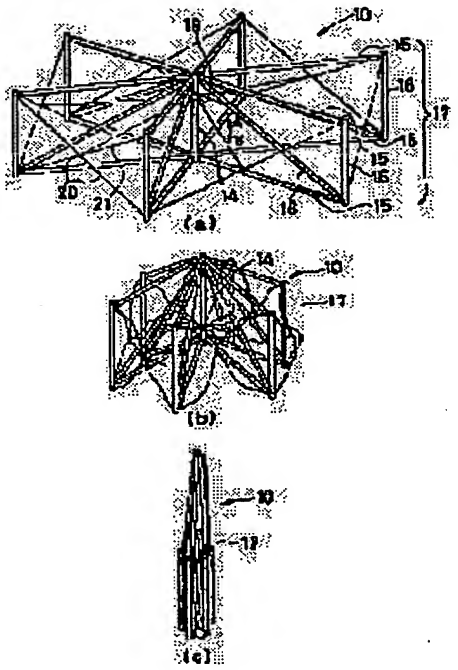
(54) DEVELOPMENT TYPE TRUSS STRUCTURE

(57)Abstract:
PURPOSE: To reduce a weight and to realize folding developing operation having reliability.
CONSTITUTION: First and second coupling rod 15 and 16 combined together in the shape of a quadrangle the one side of which forms a central rod 14 are framed and coupled radially in relation to the central rod 14 to form a frame constituting body 17. An expandable expansion contraction member 18 is spanned on the diagonal line of the quadrangle formed by using the central rod 14 and the coupling rods 15 and 16 to couple together the coupling rods. A slide member 19 is slidably arranged to the central rod 14 and the slide member 19 and the expansion contraction member 18 are linked and coupled to each other. A plurality of development thrusts 10 where first and second wire members 20 and 21 are stretched in tension structure are combined together between the frame constituting body 17 and the slide member 19.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] the expansion in which fold-up expansion is free — the expansion mold which comes to combine two or more trusses — a truss — the structure — setting — said expansion — a truss The skeleton structure with which it is combined with in the shape of [to which two or more coupling rods make said main rod one side to a main rod at a radial] a quadrilateral, and each joint is combined respectively free [bending], The elastic flexible member with which it is constructed during the joint on the diagonal line of the coupling rod combined in the shape of [of this skeleton structure] a quadrilateral, and an edge is combined respectively free [bending], The slide member by which is prepared in the main rod of said skeleton structure free [sliding], and link connection is carried out to said flexible member, respectively, The wire member stretched by tension structure between said skeleton structure and a slide member, the expansion mold which said slide member is slid to said main rod, carries out the flexible drive of said flexible member, and is characterized by coming to provide the driving means which folds up the coupling rod of said skeleton structure centering on said main rod, and is developed — a truss — the structure.
[Claim 2] the expansion mold according to claim 1 characterized by on the other hand coming to form in a field the reflecting mirror side where the flexible electric conduction film is stretched by the parabola configuration — a truss — the structure.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] the expansion mold used for the antenna equipment built in the structure with which this invention constitutes a spaceport, or space — a truss — it is related with the structure.
[0002]
[Description of the Prior Art] Development of a spaceport design is furthered in the field of space development. various kinds of expansions which include the frame of that spaceport, and the supporting-structure object of an antenna if it is in this spaceport design — a truss — after assembling the structure in the ground beforehand, it folds up and holds, and conveys to space, how to develop in space can be considered, and it is developed. such an expansion mold — a truss — two or more coupling rods indicated by JP,61-98699,A etc. as the structure — the shape of a cube — a truss — the united expansion — what a truss is combined with a desired configuration and constitutes is known. this expansion mold — a truss — expansion of plurality [driving member / with the elastic structure] — it arranges on the diagonal line of the cube side of a truss, respectively — having — **** — expansion of these plurality — folding expansion of the whole structure is performed by carrying out the flexible drive of the driving member of a truss synchronously using a drive motor.
[0003] by the way, such an expansion mold — a truss — the structure — expansion — according to the number of arrangement of the driving means of the number of the coupling rods which constitute a truss, the motor for a fold-up expansion drive, etc., the weight and the dependability of motion control are determined. for this reason, the conventional expansion mold mentioned above — a truss — in the structure, when it was difficult to aim at improvement in the dependability of weight and fold-up expansion motion control from points, such as components mark and the number for an expansion drive of motors, it was lightweight from these points and application in the field of the space development as which highly precise motion control is moreover required was taken into consideration, it was not that with which satisfaction goes.
[0004] then, the expansion mold in which the lightweight and highly precise motion control which enables installation of the antenna reflecting mirror of the diameter of macrostomia in the field of the latest space development, for example is possible — a truss — development of the structure is set to one of the pressing need technical problems.
[0005]
[Problem(s) to be Solved by the Invention] it stated above — as — the conventional expansion mold — a truss — in the structure, while weight became comparatively heavy, it had the problem that it was not that with which satisfaction at the point of the dependability of motion control goes.
[0006] the expansion mold this invention was made in view of the above-mentioned situation, is a simple configuration, and can aim at promotion of lightweight-izing, and the dependability of motion control was made to improve — a truss — it aims at offering the structure. [whose]
[0007]

[Means for Solving the Problem] In the structure the expansion which this invention can folding develop — the expansion mold which comes to combine two or more trusses — a truss — said expansion — a truss with the skeleton structure with which it is combined with in the shape of [to which two or more coupling rods make said main rod one side to a main rod at a radial] a quadrilateral, and each joint is combined respectively free [bending] The elastic flexible member with which it is constructed during the joint on the diagonal line of the coupling rod combined in the shape of [of this skeleton structure] a quadrilateral, and an edge is combined respectively free [bending], The slide member by which is prepared in the main rod of said skeleton structure free [sliding], and link connection is carried out to said flexible member, respectively, The wire member stretched by tension structure and said slide member are slid to said main rod between said skeleton structure and a slide member, the flexible drive of said flexible member is carried out, and it constitutes from a driving means which folds up the coupling rod of said skeleton structure centering on said main rod, and is developed.

[0008]

[Function] according to the above-mentioned configuration — expansion — if the slide member supported by the main rod of a skeleton structure free [sliding] slides along with a main rod by the driving means, rotation control of the coupling rod is carried out a core [a main rod], it will fold up and a truss will be developed. Thereby, a slide member is arranged in the main rod of a skeleton structure, and positive fold-up expansion actuation is realized with the configuration using the minimum component part which carries out sliding control of this slide member, and it becomes possible to aim at improvement in the dependability of motion control with promotion of lightweight-izing.

[0009]

[Example] the expansion mold hereafter applied to the example of this invention — a truss — the structure is explained to a detail with reference to a drawing.

[0010] the expansion mold which drawing 1 requires for one example of this invention — a truss — expansion of the shape of an abbreviation hexagonal prism applied to the structure — a truss 10 is shown, this drawing (a) shows an expansion condition, and folds up this drawing (b), on the way (in the middle of [expansion]) is shown, and this drawing (c) shows a fold-up condition. this expansion — a truss 10 is stretched through the support 13 called a stud as seven pieces are put together, the supporting-structure object 11 for mirror plane support of antenna equipment is formed as shown in drawing 2 , and the reflecting mirror mesh 12 shows that top-face section side as flexible electric conduction film at drawing 3 , and the mirror plane is formed. in addition, the expansion which the supporting-structure object 11 together put as shown in drawing 2 adjoins — a truss — it is together put so that the field where ten comrades counter may be shared.

[0011] the above-mentioned expansion — a truss 10 is the include angle to which two or more 1st coupling rods 15 divide a periphery equally in the both ends of this main rod 14, for example, it is together put so that it may project in the six directions at a radial, and the main rod 14 is set up and it is combined free [bending of a joint]. And between the coupling rod 15 of the both ends of the main rod 14, and 15, the 2nd coupling rod 16 is constructed, and a joint is combined free [bending], it is combined in the shape of [which makes this main rod 14 one side] a quadrilateral, and the skeleton structure 17 is formed. The flexible member 18 is constructed by this skeleton structure 17 on the diagonal line of the main rod 14 combined in the shape of a quadrilateral, and the 1st and 2nd coupling rods 15 and 16, and that edge is combined with it free [bending] at a joint.

[0012] As shown in drawing 4 , thread part 14a is formed, and the main rod 14 of the above-mentioned skeleton structure 17 is screwed in this thread part 14a free [sliding of an arrow head A and the direction of B] for the slide member 19 which constitutes the so-called umbrella device. A rotation drive is carried out by the drive motor which is not illustrated, and thread part 14a is interlocked with the rotation drive, and carries out sliding control of the slide member 19 along with the main rod 14. And the end of six link rod 19a has predetermined spacing in a slide member 19, link connection is carried out to it, and link connection of the tip of this link rod 19a is carried out to the flexible mechanical component of the above-mentioned flexible member 18.

Thereby, if the rotation drive of the thread part 14a of the main rod 14 is carried out and a slide member 19 slides along with the main rod 14 as shown in drawing 5 , a flexible drive is carried out through link rod 19a, and the flexible member 18 will fold up the 1st and 2nd coupling rods 15 and 16 centering on the main rod 14, and will develop.

[0013] Moreover, it is stretched in the shape of an abbreviation cross joint by the both ends on the diagonal line between the 2nd coupling rod 16 by which the 1st wire member 20 adjoins soil structure 17. And the end of the 2nd wire member 21 is stretched at the intersection of this 1st wire member 20, and the other end of this 2nd wire member 21 is stretched by the above-mentioned slide member 19, and is attached in tension structure.

[0014] the above-mentioned configuration — setting — expansion — if the above-mentioned drive motor (not shown) drives in the expansion condition which shows a truss 10 in this drawing (a), the rotation drive of the thread part 14a of the main rod 14 is carried out and a slide member 19 slides in the direction of arrow-head B, the reduced flexible member 18 will be elongated (refer to this drawing (b)). Then, bending control of the 1st and 2nd coupling rods 15 and 16 is carried out a core [the main rod 14], with the 1st and 2nd wire members 20 and 21, it folds up and the skeleton structure 17 is held, as shown in drawing 1 (c), and the supporting-structure object 11 whole containing the reflecting mirror mesh 12 folds it up here, and it is held in it.

[0015] and expansion — in the folding condition shown in drawing 1 (c), if thread part 14a is reversed, a slide member 19 will slide on a truss 10 in the direction of arrow-head A, and the flexible member 18 is contracted in connection with this. Then, the flexible member 18 reverses the 1st and 2nd coupling rods 15 and 16 of the skeleton structure 17 to the main rod 14, and as shown in drawing 1 (b) and (a) with the 1st and 2nd wire members 20 and 21, it is developed in order. thus, seven expansions which constitute the supporting-structure object 11 — a truss 10 synchronizes, an expansion drive is carried out, expansion of the whole supporting-structure object is realized and the reflecting mirror mesh 12 is spread here.

[0016] The structure forms the skeleton structure 17 which carried out skeleton association of the 1st and 2nd coupling rods 15 and 16 which combined the main rod 14 in the shape of [which is made into one side] a quadrilateral to the main rod 14 at the radial. thus, the above-mentioned expansion mold — a truss — While constructing the elastic flexible member 18 and joining together on the diagonal line of the shape of a quadrilateral formed by the main rod 14 and the 1st and 2nd coupling rods 15 and 16 the expansion which formed the slide member 19 in the main rod 14 free [sliding], and carried out link connection of these slide members 19 and the flexible member 18, respectively, and stretched the 1st and 2nd wire members 20 and 21 to tension structure between the skeleton structure 17 and the slide member 19 — it constituted, combining a truss 10 two or more. According to this, a slide member 19 is arranged in the main rod 14 of the skeleton structure 17, and it becomes possible to realize positive fold-up expansion actuation, to be able to attain mitigation-ization of that fold-up expansion driving means as compared with the former, and to aim at improvement in the dependability of motion control with promotion of lightweight-izing with the configuration using the minimum component part which carries out sliding control of this slide member 19. moreover, expansion — it becomes possible to constitute only from having the main rod 14, the 1st and 2nd coupling rods 15 and 16, and the flexible member 18 by using a truss 10 as a **** component part — especially, remarkable effectiveness is expected in respect of promotion of lightweight-izing strongly demanded in space development.

[0017] In addition, in the above-mentioned example, the 1st wire member 20 stretched by tension structure is stretched in the shape of an abbreviation cross joint on the diagonal line between the 2nd coupling rod 16 which the skeleton structure 17 adjoins. It constituted so that the 2nd wire member 21 might be stretched to tension structure between the intersection of this 1st wire member 20, and a slide member 19, but without restricting to this, as shown, for example in drawing 6 , you may constitute so that the 1st and 2nd wire members 20a and 21a may be stretched. That is, 1st wire member 20a is stretched to abbreviation parallel among the both ends of the 2nd adjoining coupling rod 16, and between the abbreviation center section of this 1st wire member 20a, and a slide member 19, 2nd wire member 21a is stretched and it attaches at tension structure.

[0018] moreover -- the above-mentioned example -- expansion -- although it constituted so that thread part 14a might be prepared in the main rod 14, a slide member 19 might be made to screw in this thread part 14a as a driving means which folds up a truss 10 and is developed, the rotation drive of thread part 14a might be interlocked with and a slide member 19 might be slid, it is also possible to constitute so that a slide member 19 may be slid using a spring device, without restricting to this.
[0019] Furthermore, although the 1st and 2nd coupling rods 15 and 16 combined in the shape of a quadrilateral to the main rod 14 as a skeleton structure 17 were arranged and constituted from an above-mentioned example in the six directions at the radial, as these radiation direction numbers, various kinds of arrangement is possible, without restricting to this number.
[0020] furthermore -- the above-mentioned example -- expansion -- although explained on behalf of the case where it applies to the antenna equipment which formed the supporting-structure object 11 combining seven trusses 10, it can constitute, without restricting to the combination of this number. And it is also possible to apply to the structure of the various kinds containing the frame of a spaceport and various kinds of buildings built on the ground as applicability. Therefore, as for this invention, it is needless to say that deformation various in the range which does not deviate from the summary of this invention can be carried out, without restricting to the above-mentioned example.
[0021]
[Effect of the Invention] the expansion mold can aim at promotion of lightweight-izing and the dependability of motion control was made to improve with a simple configuration according to this invention as explained in full detail above -- a truss -- the structure can be offered.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] the expansion mold concerning one example of this invention — a truss — expansion of the structure — drawing having shown the truss.
[Drawing 2] expansion of drawing 1 — drawing having shown the antenna equipment constituted using the truss.
[Drawing 3] Drawing having shown the detail of the attachment condition of the reflecting mirror mesh of drawing 3 .
[Drawing 4] Drawing having shown the arrangement condition of the slide member of drawing 1 .
[Drawing 5] Drawing having shown a part of operating state of drawing 1 .
[Drawing 6] Drawing having shown other examples of this invention.
[Description of Notations]
10 — expansion — a truss, 11 — supporting-structure object, and 12 — a reflecting mirror mesh, 13 — support, 14 — core rod, and 15 — the 1st coupling rod, the 16 — 2nd coupling rod, 17 — skeleton structure, and 18 — flexible member, 19 — slide member, 19a— link rod, 20, and 20a— 1st wire member, 21, and 21a— the 2nd wire member.

[Translation done.]

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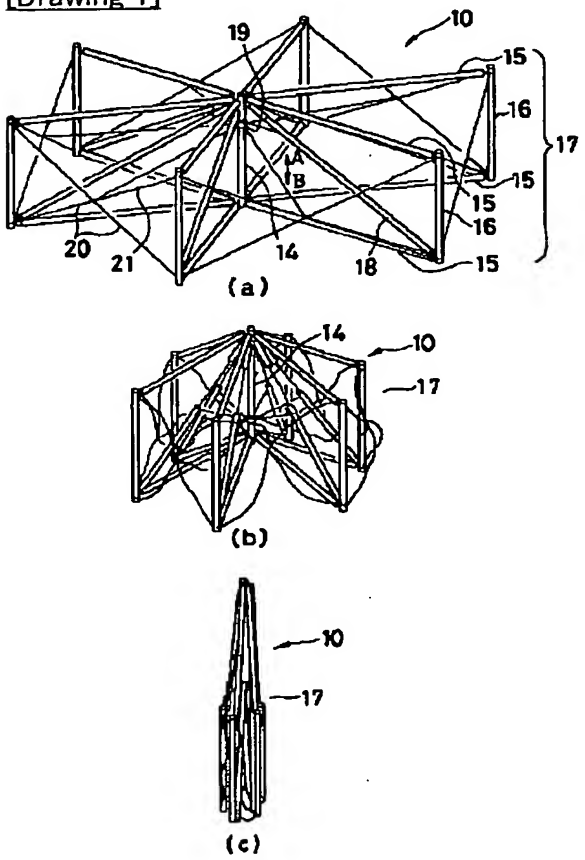
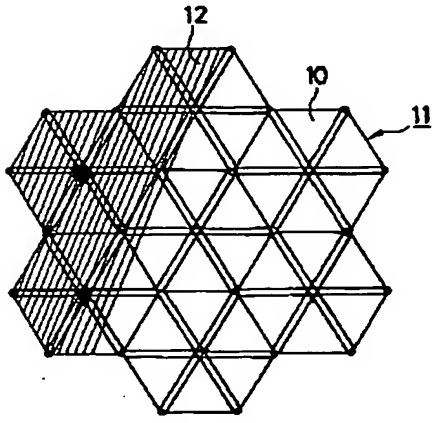
DRAWINGS

[Drawing 1]



[Drawing 2]



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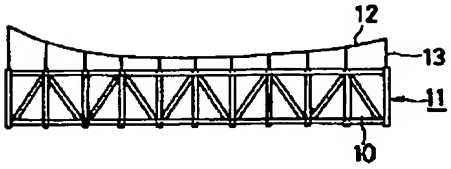
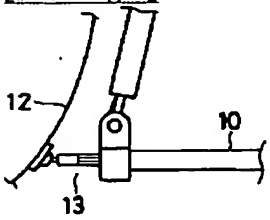
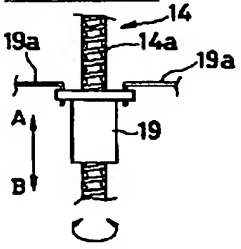


(b)

[Drawing 3]



[Drawing 4]



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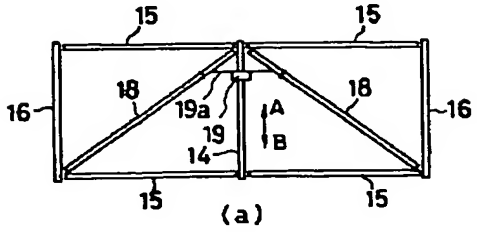
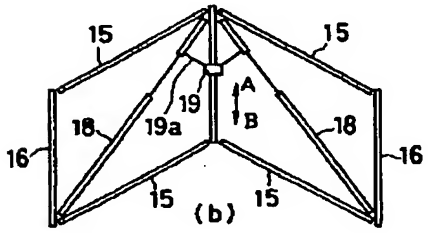
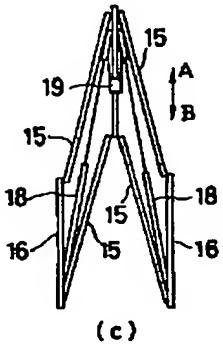
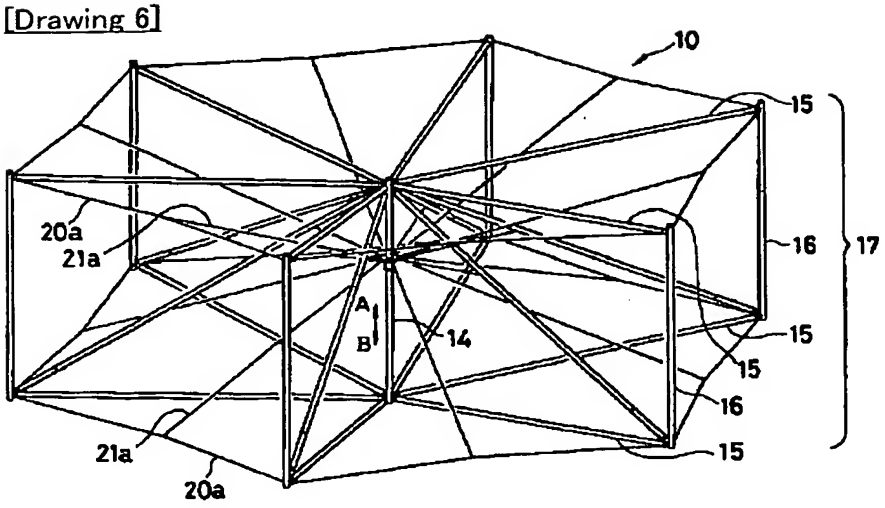






[Drawing 6]



[Translation done.]

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審査請求　有　　請求項の数２(全　５　頁)

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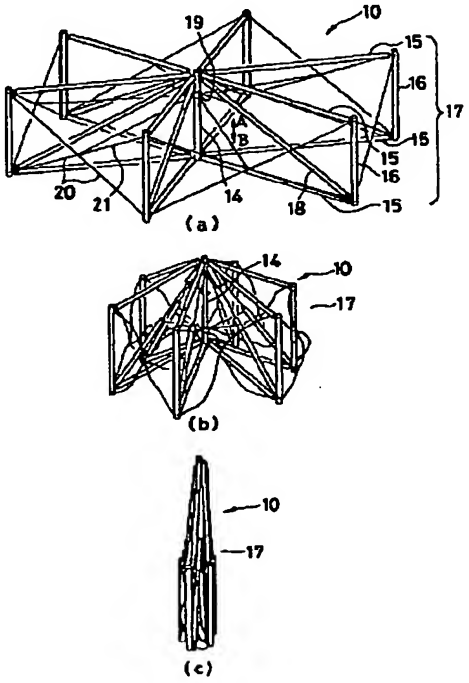
(54)【発明の名称】　展開型トラス構造体

(57)【要約】
【目的】この発明は、軽量化と共に、信頼性のある折畳み展開動作を実現し得るようにすることにある。
【構成】中心棒１４を一辺とする四辺形状に組合せた第１及び第２の連結棒１５，１６を該中心棒１４に対して放射状に骨組結合した骨組構体１７を形成して、その中心棒１４、第１及び第２の連結棒１５，１６で形成される四辺形状の対角線上に伸縮自在な伸縮部材１８を架設して結合すると共に、中心棒１４に摺動自在に摺動部材１９を設け、これら摺動部材１９と伸縮部材１８をそれぞれリンク結合し、かつ骨組構体１７及び摺動部材１９間に第１及び第２のワイヤ部材２０，２１をテンション構造に張着した展開トラス１０を複数個組合わせて構成したものである。



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【特許請求の範囲】
【請求項１】　折畳み展開自在な展開トラスを複数個組合わせてなる展開型トラス構造体において、
前記展開トラスは、
中心棒に対して放射状に複数の連結棒が前記中心棒を一辺とする四辺形状に組合わされて各節点がそれぞれ折曲自在に結合される骨組構体と、
この骨組構体の四辺形状に組合わせた連結棒の対角線上の節点間に架設されて端部がそれぞれ折曲自在に結合される伸縮自在な伸縮部材と、
前記骨組構体の中心棒に摺動自在に設けられるものであって、前記伸縮部材にそれぞれリンク結合される摺動部材と、
前記骨組構体及び摺動部材間にテンション構造に張着されるワイヤ部材と、
前記摺動部材を前記中心棒に対して摺動させて前記伸縮部材を伸縮駆動し、前記骨組構体の連結棒を前記中心棒を中心に折畳み展開する駆動手段とを具備してなることを特徴とする展開型トラス構造体。
【請求項２】　一方面に可撓性導電膜がパラボラ形状に張設される反射鏡面が形成されてなることを特徴とする請求項１記載の展開型トラス構造体。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】この発明は、例えば宇宙基地を構成する構造物や宇宙空間に構築されるアンテナ装置等に用いられる展開型トラス構造体に関する。
【０００２】
【従来の技術】宇宙開発の分野においては、宇宙基地構想の開発が進められている。この宇宙基地構想にあっては、その宇宙基地の骨格や、アンテナの支持構造体を含む各種の展開トラス構造体を、予め地上において組立てた後、折畳み収容して宇宙空間まで輸送し、宇宙空間で展開させる方法が考えられ、開発されている。このような展開型トラス構造体としては、特開昭６１－９８６９９号公報等に記載されるところの複数の連結棒を立方体状にトラス結合した展開トラスが複数個、所望の形状に組合わされて構成するものが知られている。この展開型トラス構造体は、伸縮自在な駆動部材が複数の展開トラスの立方体面の対角線上にそれぞれ配設されており、これら複数個の展開トラスの駆動部材を駆動モータを用いて同期して伸縮駆動させることにより、構造体全体の折畳み展開が行われる。
【０００３】ところで、このような展開型トラス構造体は、展開トラスを構成する連結棒の数及び折畳み展開駆動用モータ等の駆動手段の配置数に応じて、その重量及び動作制御の信頼性が決定される。このため、上述した従来の展開型トラス構造体では、部品点数と展開駆動用モータ数等の点から重量及び折畳み展開動作制御の信頼性の向上を図ることが困難であり、これらの点から軽量

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で、しかも高精度な動作制御の要求される宇宙開発の分野での適用を考慮すると、満足の行くものでなかった。
【０００４】そこで、最近の宇宙開発の分野においては、例えば大口径のアンテナ反射鏡の設置を可能とする軽量で、高精度な動作制御が可能な展開型トラス構造体の開発が急務な課題の一つとされている。
【０００５】
【発明が解決しようとする課題】以上述べたように、従来の展開型トラス構造体では、重量が比較的重くなると共に、動作制御の信頼性の点で満足の行くものでないという問題を有していた。
【０００６】この発明は上記の事情に鑑みてなされたもので、簡易な構成で、軽量化の促進を図り得、且つ、動作制御の信頼性を向上し得るようにした展開型トラス構造体を提供することを目的とする。
【０００７】
【課題を解決するための手段】この発明は、折畳み展開自在な展開トラスを複数個組合わせてなる展開型トラス構造体において、前記展開トラスを、中心棒に対して放射状に複数の連結棒が前記中心棒を一辺とする四辺形状に組合わされて各節点がそれぞれ折曲自在に結合される骨組構体と、この骨組構体の四辺形状に組合わせた連結棒の対角線上の節点間に架設されて端部がそれぞれ折曲自在に結合される伸縮自在な伸縮部材と、前記骨組構体の中心棒に摺動自在に設けられるものであって、前記伸縮部材にそれぞれリンク結合される摺動部材と、前記骨組構体及び摺動部材間にテンション構造に張着されるワイヤ部材と、前記摺動部材を前記中心棒に対して摺動させて前記伸縮部材を伸縮駆動し、前記骨組構体の連結棒を前記中心棒を中心に折畳み展開する駆動手段とで構成したものである。
【０００８】
【作用】上記構成によれば、展開トラスは骨組構体の中心棒に摺動自在に支持される摺動部材が駆動手段により、中心棒に沿って摺動されると、連結棒が中心棒を中心として回動制御されて折畳み展開される。これにより、骨組構体の中心棒に摺動部材を配設し、この摺動部材を摺動制御するだけの最小限の構成部品を用いた構成で、確実な折畳み展開動作が実現され、軽量化の促進と共に、動作制御の信頼性の向上を図ることが可能となる。
【０００９】
【実施例】以下、この発明の実施例に係る展開型トラス構造体について、図面を参照して詳細に説明する。
【００１０】図１はこの発明の一実施例に係る展開型トラス構造体に適用される略六角柱状の展開トラス１０を示すもので、同図（ａ）は展開状態を示し、同図（ｂ）は折畳み途中（展開途中）を示し、同図（ｃ）は折畳み状態を示す。この展開トラス１０は、例えば図２に示すように７個が組合わされてアンテナ装置の鏡面支持用の

支持構造体１１が形成され、その上面部側には可撓性導電膜として、反射鏡メッシュ１２が図３に示すように、スタッドと称する支持具１３を介して張設されて鏡面が形成されている。なお、図２に示すように組合わされた支持構造体１１は、隣接する展開トラス１０同士の対向する面を共用するように組合されている。

【００１１】上記展開トラス１０は、中心棒１４が立設され、この中心棒１４の両端には複数の第１の連結棒１５が円周を等分する角度で、例えば６方向に放射状に突出するように組合わされて節点が折曲自在に結合される。そして、中心棒１４の両端の連結棒１５，１５間は第２の連結棒１６が架設されて節点が折曲自在に結合され、該中心棒１４を一辺とする四辺形状に結合されて骨組構体１７が形成される。この骨組構体１７には四辺形状に結合される中心棒１４、第１及び第２の連結棒１５，１６の対角線上に伸縮部材１８が架設され、その端部が節点に折曲自在に結合される。

【００１２】上記骨組構体１７の中心棒１４は、例えば図４に示すように螺子部１４ａが形成され、この螺子部１４ａにはいわゆる傘機構を構成する摺動部材１９が矢印Ａ，Ｂ方向に摺動自在に螺合される。螺子部１４ａは図示しない駆動モータにより回転駆動され、その回転駆動に連動して摺動部材１９を中心棒１４に沿って摺動制御する。そして、摺動部材１９には６本のリンクロッド１９ａの一端が所定の間隔を有してリンク結合され、このリンクロッド１９ａの先端は上記伸縮部材１８の伸縮駆動部にリンク結合される。これにより、伸縮部材１８は図５に示すように、中心棒１４の螺子部１４ａが回転駆動されて摺動部材１９が中心棒１４に沿って摺動されると、リンクロッド１９ａを介して伸縮駆動されて第１及び第２の連結棒１５，１６を中心棒１４を中心に折畳み展開する。

【００１３】また、骨組構造１７には第１のワイヤ部材２０が隣接する第２の連結棒１６間における対角線上の両端に略十字状に張着される。そして、この第１のワイヤ部材２０の交点には、第２のワイヤ部材２１の一端が張着され、この第２のワイヤ部材２１の他端は上記摺動部材１９に張着されてテンション構造に取付けられる。

【００１４】上記構成において、展開トラス１０は、同図（ａ）に示す展開状態において、上記駆動モータ（図示せず）が駆動されて中心棒１４の螺子部１４ａが回転駆動され、摺動部材１９が矢印Ｂ方向に摺動されると、縮小された伸縮部材１８が伸長される（同図（ｂ）参照）。すると、骨組構体１７は、その第１及び第２の連結棒１５，１６が中心棒１４を中心として折曲制御されて、図１（ｃ）に示すように第１及び第２のワイヤ部材２０，２１と共に折畳み収容され、ここに反射鏡メッシュ１２を含む支持構造体１１全体が折畳み収容される。

【００１５】そして、展開トラス１０は、図１（ｃ）に示す折畳み状態において、螺子部１４ａが反転されると、摺動部材１９が矢印Ａ方向に摺動され、これに伴って、伸縮部材１８が収縮される。すると、伸縮部材１８は骨組構体１７の第１及び第２の連結棒１５，１６を中心棒１４に対して反転させ、第１及び第２のワイヤ部材２０，２１と共に図１（ｂ），（ａ）に示すように順に展開される。このように支持構造体１１を構成する７個の展開トラス１０は同期して展開駆動され、ここに、支持構造体全体の展開が実現されて反射鏡メッシュ１２が展張される。

【００１６】このように、上記展開型トラス構造体は、中心棒１４を一辺とする四辺形状に組合せた第１及び第２の連結棒１５，１６を中心棒１４に対して放射状に骨組結合した骨組構体１７を形成して、その中心棒１４、第１及び第２の連結棒１５，１６で形成される四辺形状の対角線上に伸縮自在な伸縮部材１８を架設して結合すると共に、中心棒１４に摺動自在に摺動部材１９を設け、これら摺動部材１９と伸縮部材１８をそれぞれリンク結合し、かつ骨組構体１７及び摺動部材１９間に第１及び第２のワイヤ部材２０，２１をテンション構造に張着した展開トラス１０を複数個組合わせて構成した。これによれば、骨組構体１７の中心棒１４に摺動部材１９を配設し、この摺動部材１９を摺動制御するだけの最小限の構成部品を用いた構成で、確実な折畳み展開動作が実現され、従来に比して、その折畳み展開駆動手段の軽減化が図れて軽量化の促進と共に、動作制御の信頼性の向上を図ることが可能となる。また、展開トラス１０を剛な構成部品として中心棒１４、第１及び第２の連結棒１５，１６、伸縮部材１８を備えるだけで構成することが可能となることにより、特に宇宙開発において強く要請される軽量化の促進という点で顕著な効果が期待される。

【００１７】なお、上記実施例では、テンション構造に張着される第１のワイヤ部材２０を骨組構体１７の隣接する第２の連結棒１６間における対角線上に略十字状に張着し、この第１のワイヤ部材２０の交点と摺動部材１９間に第２のワイヤ部材２１をテンション構造に張着するように構成したが、これに限ることなく、例えば図６に示すように、第１及び第２のワイヤ部材２０ａ，２１ａを張着するように構成しても良い。即ち、第１のワイヤ部材２０ａを隣接する第２の連結棒１６の両端間に略平行に張着し、この第１のワイヤ部材２０ａの略中央部と摺動部材１９間に第２のワイヤ部材２１ａを張着してテンション構造に取付けるものである。

【００１８】また、上記実施例では、展開トラス１０を折畳み展開する駆動手段として、中心棒１４に螺子部１４ａを設け、この螺子部１４ａに摺動部材１９を螺合させて、螺子部１４ａの回転駆動に連動して摺動部材１９を摺動させるように構成したが、これに限ることなく、ばね機構を用いて摺動部材１９を摺動させるように構成することも可能である。

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【００１９】さらに、上記実施例では、骨組構体１７として、中心棒１４に対して四辺形状に組合わせた第１及び第２の連結棒１５，１６を６方向に放射状に配置して構成したが、この放射方向数としては、この数に限ることなく、各種の配置が可能である。

【００２０】また、さらに、上記実施例では、展開トラス１０を７個組合せて支持構造体１１を形成したアンテナ装置に適用した場合を代表して説明したが、この数の組合せに限ることなく、構成可能である。そして、適用範囲としては、宇宙基地の骨格を含む各種の構造物や、地上に構築する各種の建築物に適用することも可能である。よって、この発明は上記実施例に限ることなく、その他、この発明の要旨を逸脱しない範囲で種々の変形を実施し得ることは勿論である。

【００２１】

【発明の効果】以上詳述したように、この発明によれば、簡易な構成で、軽量化の促進を図り得、且つ、動作制御の信頼性を向上し得るようにした展開型トラス構造体を提供することができる。

【図面の簡単な説明】

【図１】この発明の一実施例に係る展開型トラス構造体の展開トラスを示した図。

【図２】図１の展開トラスを用いて構成したアンテナ装置を示した図。

【図３】図３の反射鏡メッシュの取付状態の詳細を示した図。

【図４】図１の摺動部材の配置状態を示した図。

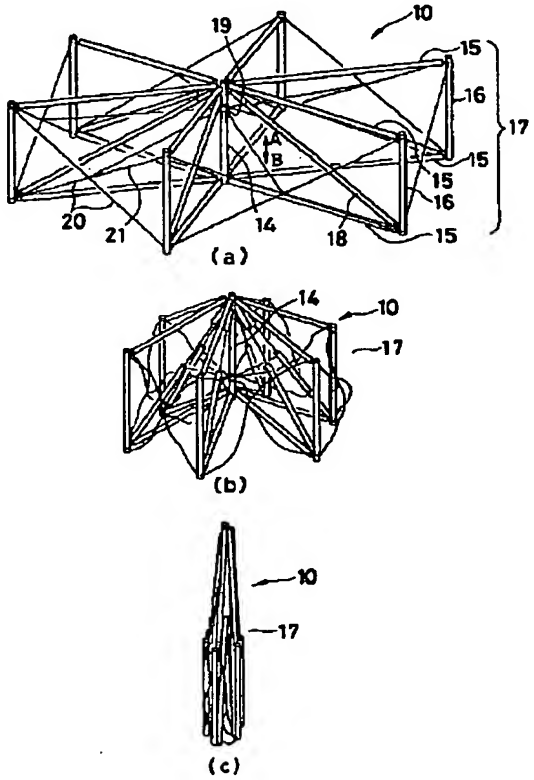
【図５】図１の一部の動作状態を示した図。

【図６】この発明の他の実施例を示した図。

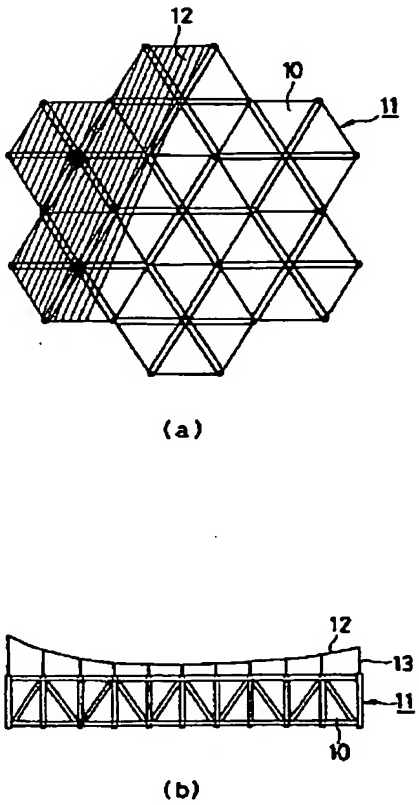
【符号の説明】

１０…展開トラス、１１…支持構造体、１２…反射鏡メッシュ、１３…支持具、１４…中心棒、１５…第１の連結棒、１６…第２の連結棒、１７…骨組構体、１８…伸縮部材、１９…摺動部材、１９ａ…リンクロッド、２０，２０ａ…第１のワイヤ部材、２１，２１ａ…第２のワイヤ部材。

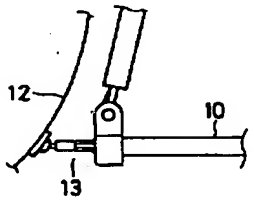
【図１】



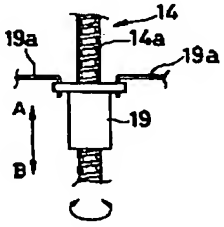
【図２】



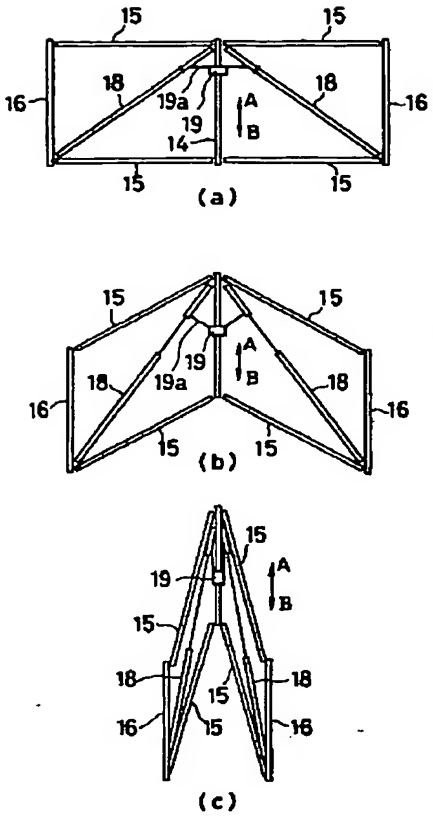
【図３】



【図４】



【図５】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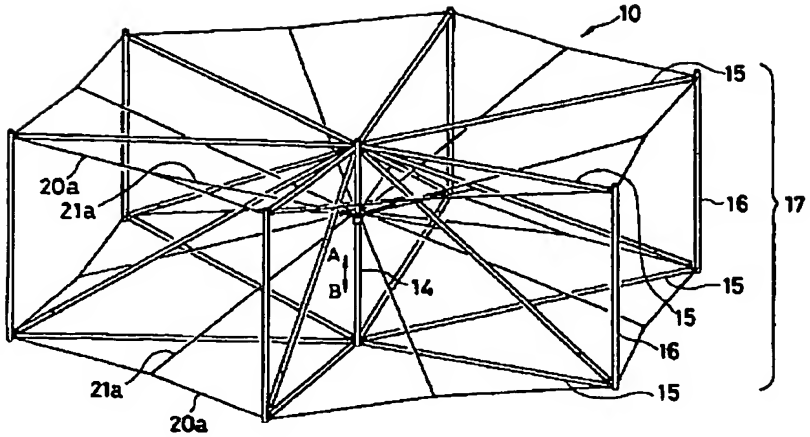
(c)

【図６】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21a
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